Development of temperature indicators for California Streams

David B Buchwalter

Public Comments

No public comments were received for this proposal.

Technical Synthesis Panel Review

Proposal Title

#0290: Development of temperature indicators for California Streams

Final Panel Rating
inadequate

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

There is value in developing stressor-specific indicators as is being proposed here. However, I am not convinced that one is needed for temperature. It is such a simple and inexpensive parameter to measure these days, that I don't see the justification for an investment of this magnitude. One could buy an awful lot of temperature loggers for that price! I am not convinced that these data will provide a meaningful tool for managers to use. The proposal provides little evidence that the product of this research would be used by managers or that the need for the product is very great. Respirometry experiments are proposed to run for 10 days. Are the insects feeding during that time? How is respiration of their food factored in? If they are starving, I question the value of these measurements. There is no attempt to validate this approach in the field; e.g. use recording thermographs in a number of streams, sample insects, see if the predictions from this approach agree with what the thermograph is telling you. This is an extremely high budget largely a result of an expensive piece of equipment and the entire salary of one investigator.

Additional Comments:

External reviewers rated this proposal good, fair and good. They argued that the need for this research was not convincingly provided, although the value in finding indicators that can be linked with specific stressors was recognized. There are potential problems using genus−level indentification resulting from different species in California and Oregon in the same genus but with different thermal tolerances. Reviewers were not convinced that the measures of metabolic end products (which require a very expensive piece of equipment) were necessary. They argued that this is a research intensive approach to what is basically a simple problem of using distribution and temperature data to identify coldwater indicators. The nature of the data from Oregon was not clear. A list of candidate species would have been useful. There is no indication of how seasonal or developmental changes in thermal tolerance would be assessed. No corroboration with field data is proposed, which is another shortcoming (e.g. use the proposed indicators at a number of sites where there is a good thermal record). Insect indicators are used because they provide an integrated picture of conditions over an extended period. In this case, that is a disadvantage because what is of immediate concern to salmonid survival is the temperature conditions when they are in the streams. Temperature conditions when they are not there are less relevant. It is not clear if managers would use this information. Reviewers felt that the budget is high compared to expected products. All suggested data loggers would be a simpler alternative.

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Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

Development of temperature indicators for California streams

The panel recognized that finding better indicators of specific stressors is a worthwhile goal, but ranked this proposal as inadequate because the methodology proposed was not a reasonable alternative to use of data loggers to monitor temperature. The proposed technique would provide no added value in obtaining temperature data. The panel also expressed concerns regarding details of the respirometer experiments; what the maintenance condition of the experimental insects would be; the lack of validation in the field; and the potential for species level differences in thermal sensitivities of California species vs. Oregon species. There was concern about a possible mismatch in the larval stage residency time and the period salmon are present in the stream. Larval insects are useful indicators because they integrate temperature conditions over a long time period. In this case, that is a detriment because the critical condition is temperatures during a short period when juvenile salmon are in the stream.

Final Ranking: Inadequate

Technical Review #1

proposal title: Development of temperature indicators for California Streams

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**Yes.**
Rating	**excellent**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**yes. Value of stressor−specific indicators is increasingly being recognized. Identification of species that are temperature−sensitive has a high likelihood of success. The Oregon data base is a good resource for identifying cold−water species. I agree that their presence is an indicator of long−term conditions.** **I don't recall any pilot data.**
Rating	**very good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**This is a high−tech approach to a simple problem, that of identifying cold−water indicator species. (In reality, I assume this means genera, which is an issue − suppose some coldwater species of baetis in oregon is replaced by a warmwater species in california − the screening of Oregon insevt distribution data could be inaccurate.) I'm almost sold that the respirometer approach is a good idea, and improves over the lethal temperature bath approach (e.g. Quinn and others). But is it really necessary to screen for metabolites showing the shift from aerobic to anaerobic respiration?**
Rating	**good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**I think it is feasible and likely will provide useful results. I'm concerned that genus−level rather than species−level identification may be used, and unrecognized species replacements could make results difficult to apply.**
Rating	**good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**not applicable**
Rating	**good**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	in principle, yes. cold temperature indicator species would be useful.
Rating	very good

Additional Comments

Comments	my main reservations are: 1. this is very reserach-intensive approach to a potentially simple problem, of using distribution and temperature data to identify coldwater indicators. 2. if the identification is genus-level, there may be unrecognized species replacements that muddy the results. 3. what about using temperature loggers?

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	PI looks well trained and very capable.
Rating	excellent

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	$45 k in gadgetry, $90 k each year in salary. not a lot of money for a good young scientist to generate some potneitally useful data and demo a new approach. feels a tad 'academic'
Rating	

	good

Overall

Provide a brief explanation of your summary rating.

Comments	**interesting research area, temperature indicators likely can be identified and be os use. sophisticated technically. seems rather academic for calfed restoration funding.**
Rating	**good**

Technical Review #2

proposal title: Development of temperature indicators for California Streams

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The overall goal of this proposal is to generate a list of aquatic insect species that are indicative of cold water conditions that salmonids require. Particular objectives are not clearly stated and no hypothesis is put forward. On possible hypothesis could be: Suites of insects are just as good, if not better, indicators of stream thermal conditions than are data loggers. While the idea appears to be important, as it concerns salmonid restoration efforts, the author makes no claims that there is an immediate need for this information.**
Rating	**fair**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**Justification for this project is that easy, rapid and cost effective tools are needed that allow for evaluating thermal conditions in California streams for suitability for early salmonid life stages. Figure 1 does not provide a clear conceptual model for this work. The author does not clearly justify his particular methods over use of the correlative data obtained from Oregon DEQ (what this data consists of**

	is not clear at all).
Rating	**fair**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**Based on Oregon DEQ temperature data for 209 invertebrate species, approximately 35 insect species will be chosen. Only species that are important dietary components of early salmonid life stages will be chosen (for use as indicators, this does not seem necessary). Oxygen consumption will be measured over 10 days at increasing temperatures (n = 4) (unclear if there will be a blank or control chamber). Following exposure to different temperatures, insect larvae will be assayed for anaerobic metabolites, an indicator of thermal limits. This will add to our base of knowledge and generate novel information concerning the temperatures at which aquatic insect larvae shift from aerobic to anaerobic metabolic processes. Very few details of the methods were provided so it is difficult to determine if the approach is well designed or appropriate for meeting the goals and objectives. One potential problem is that tolerances will be measured between April and October. What if insect tolerance changes seasonally? How useful will this information be in a different season? How long are the developmental periods of these insects? The information generated could potentially be used by decision makers in salmonid restoration efforts, however, this is not explicitly outlined by the author.**
Rating	**fair**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The approach and methods are not adequately documented to determine if they are technically feasible. It is unclear if this author has experience with these very ambitious techniques and methods. It is unclear if examining 35 species is adequate or overkill to address the objectives.**
Rating	**poor**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**Although this project will generate information useful in monitoring streams using insect suites, no monitoring is intended in the proposed project.**
Rating	**not applicable**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**Results will be published in peer−reviewed journals and a photo identification booklet of insects will be produced. No mention is made of dissemination to those agencies involved in salmonid or stream restoration. It is unclear whether the data will be interpreted for use by these agencies. The author says that the development of insect temperature indicators could be readily integrated into several ongoing programs but**

	these are not discussed at all.
Rating	fair

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	This project will be conducted by David Buchwalter in its entirety. This author has an impressive list of publications in aquatic toxicology. As mentioned previously, however, it is unclear if the author has experience doing these particular types of experiments so it is unclear if he will be able to efficiently and effectively implement the proposed project. The infrastructure is not available to this project and will need to be purchased. Equipment to be purchased includes a respiratory system and ion chromatography system. USGS will provide lab and office space and gas chromatograph. No mention is made of a truck or stream sampling equipment.
Rating	good

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	The budget is high compared to expected products. This is primarily because of equipment purchase and salary. It is unclear why, if Buchwalter works for USGS, he needs to request salary.
Rating	good

Overall

Provide a brief explanation of your summary rating.

Comments	**While this proposal contains some good ideas, the approach is not well-justified and it is unclear if results will be disseminated to those agencies who can actually apply them.**
Rating	**fair**

Technical Review #3

proposal title: Development of temperature indicators for California Streams

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The goals are clearly stated and the laboratory methods are fairly clear. i am unclear why actual field temperatures are not going to be collected as well to test the hypothesis that understanding aerobic to anaerobic switches predict species losses. I am also surprised a list of species to be tested has not been included.**
Rating	**very good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**I think the basic scientific aspects of this research are very good. However, I am a bit surprised that the results will not be corroborated with field temperature measures to validate the predictions. It is very easy these days to get very good temperature data from remotely sensed and sensor technologies. I would think bridging actual field measures with the respirometry would have made this a very good project.**
Rating	**good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**The approaches are straightforward and doable. the basic science aspects of the project will be novel.**
Rating	**very good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**I think the project is doable. once again, i am unclear as to why the investigator has not already done some pilot work and why a species list of candidate species has not been incorporated.**
Rating	**good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**there is little monitoring involved**
Rating	**not applicable**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**Once again, the basic finding will be very interesting. i think it would be much more helpful to actually tie the laboratory results to field measures of temperature and insect presence/absence**
Rating	**good**

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The investigators track record certainly suggests that he is capable of performing the proposed research**
Rating	**very good**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**I am a bit taken aback, that the investigator proposes to recover 100% of his salary over two years plus charge overhead. I would think that a matching agreement or at least overhead waiver would be required.**
Rating	**fair**

Overall

Provide a brief explanation of your summary rating.

Comments	**overall, i find the proposed research to be interesting and creative. the weaknesses all stem from**

	a lack of prediction or hypothesis testing given the vast amounts of data available.
Rating	**good**